

REMARKS/ARGUMENTS

This Amendment is being filed in response to the final Official Action of July 25, 2006, 2005. Again, following Applicants' Preliminary Amendment of September 20, 2004, the present application includes currently pending Claims 1, 3-6, 8-11, 13-16 and 18-20. The final Official Action now rejects Claims 1, 3-6, 8-11 and 13-15 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application Publication No. 2005/0040209 to Stotler et al. Also, the final Official Action continues to reject all of the pending claims under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application Publication No. 2005/0001010 to Koga et al. In addition, the final Official Action continues to reject Claims 1, 3, 6, 8, 11, 13, 16 and 18 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,708,865 to Yoshinaga, or by U.S. Patent No. 6,050,475 to Kinton et al.

As described below in detail, Applicants respectfully submit that the Examiner prematurely issued a final Official Action due to the introduction of the new grounds of rejection. As also described below, Applicants respectfully submit that the claimed invention is patentably distinct from Stotler, Koga, Yoshinaga and Kinton, taken individually or in combination. Nonetheless, Applicants have amended all of the pending claims to further clarify the claimed invention, and added new Claims 21-24 to claim additional patentable aspects of the present invention. In view of the amended and newly added claims, and the remarks presented herein, Applicants respectfully request reconsideration of the present application and allowance of the pending set of claims, or in lieu thereof at least withdrawal of the finality of the present Official Action. Should the Examiner maintain the finality of the Official Action, however, Applicants respectfully request entry of this correspondence for purposes of narrowing the issues upon appeal as the remarks presented herein do not raise any new issues or introduce any new matter.

I. Finality of the Official Action is Premature

In the second Official Action of December 21, 2005, the Examiner rejected all of the pending claims as being anticipated by Koga; rejected Claims 1, 3, 6, 8, 11, 13, 16 and 18 as being anticipated by Yoshinaga, Kinton or U.S. Patent Application Publication No.

2004/0173663 to Okamoto et al.; and rejected Claims 1, 3, 4, 6, 8, 9, 11, 14, 16, 18 and 19 as being anticipated by U.S. Patent No. 6,742,696 to Thompson. In response, Applicants traversed the rejections of the claims and presented remarks distinguishing the claimed invention from the cited references. Now, in the present final Official Action, the Examiner no longer rejects any of the claims over Okamoto or Thompson, and again rejects all of the pending claims as being anticipated by Koga, and rejects Claims 1, 3, 6, 8, 11, 13, 16 and 18 as being anticipated by Yoshinaga or Kinton. In addition and in contrast to the second Official Action, however, the Examiner now rejects Claims 1, 3-6, 8-11 and 13-15 as being anticipated by Stotler.

In accordance with MPEP § 706.07(a), a second or subsequent Official Action shall be made final, "except where the examiner introduces a new ground of rejection that is neither necessitated by applicant's amendment of the claims nor based on information submitted in an information disclosure statement filed during the period set forth in 37 CFR § 1.97(c) with the fee set forth in 37 CFR § 1.17(p)." In the instant case, the Examiner alleges that "Applicant's amendment necessitated the new ground(s) of rejection presented in [the final] Office Action." Final Official Action of July 25, 2006, page 5. Applicants respectfully disagree, however, and respectfully submit that Applicant's did not amend any of the pending claims in response to the second Official Action of December 21, 2005. And further, Applicants respectfully submit that the Examiner did not introduce any new ground of rejection for any reason necessitated by Applicants filing of an information disclosure statement during the period following mailing of the first Official Action, as would be during the period set forth in 37 CFR § 1.97(c).

For at least the foregoing reasons, Applicants respectfully submit that, in accordance with MPEP § 706.07(a), the Examiner prematurely issued a final Official Action. Accordingly, Applicant respectfully requests withdrawal of the finality of the current Official Action.

II. The Claimed Invention is Patentable over the Cited References

Various ones of the claims of the present application are separately rejected as being anticipated by Stotler, Koga, Yoshinaga and/or Kinton. Accordingly, the rejections of the claims will be separately addressed below in a similar fashion.

A. Claims 1, 3-6, 8-11 and 13-15 are Patentable over Stotler

The Official Action rejects Claims 1, 3-6, 8-11 and 13-15 as being anticipated by Stotler. Amended independent Claim 1 recites a friction stir welding system that includes a friction stir welding (FSW) device and a controller. The FSW device includes an actuator configured for moving a FSW tool relative to a workpiece. In this regard, the actuator comprises a plunge actuator configured for moving the FSW tool along a plunge axis. The controller, in turn, is configured for controlling the FSW device to drive the actuator to move the FSW tool relative to the workpiece such that the FSW tool is configured for performing a friction stir welding operation on the workpiece.

The controller is configured for monitoring a torque of the actuator where, as amended, the controller is configured for monitoring the torque in accordance with one or more numerical control instructions designed for machining components. Accordingly, the controller is configured for controlling the FSW device to drive the actuator such that the torque is maintained within a range about a torque setting. More particularly, the controller is configured for controlling the FSW device such that the plunge actuator is driven to move the FSW tool into further contact with the workpiece when the torque decreases below a range about a plunge torque setting. Conversely, the controller is configured for controlling the FSW device such that the plunge actuator is driven to move the FSW tool into reduced contact with the workpiece when the torque increases above the range about the plunge torque setting.

Similar to amended independent Claim 1, Stotler discloses a friction stir welding system. In contrast to the claimed invention, however, Stotler does not teach or suggest monitoring the torque of a plunge actuator configured for moving the FSW tool along a plunge axis, or accordingly controlling a FSW device such that the plunge actuator is driven to move the FSW tool into further or reduced contact with the workpiece based upon the torque and a range about a plunge torque setting. Stotler does disclose a torque sensor measuring the torque on a friction stir welding tool. However, Stotler does not teach or suggest that the torque sensor measures the torque of a plunge actuator moving the tool along a plunge axis, as recited by the claimed invention. Instead, Stotler is silent as to the exact torque measured by the torque sensor. Nonetheless, Stotler strongly suggests that the torque measured by the torque sensor is a torque

along a travel axis or weld path. In this regard, Stotler is principally directed to a friction stir welding travel axis load control method and apparatus. And as claimed, the method of Stotler controls the travel axis load based on an error signal that may be generated based on the aforementioned torque measurement.

Further in contrast to amended independent Claim 1, Stotler does not teach or suggest monitoring the torque of the plunge actuator in accordance with one or more numerical control (NC) instructions designed for machining components. Again, Stotler does disclose a torque sensor measuring the torque on a friction stir welding tool. But nowhere does Stotler teach or suggest monitoring any torque, much less a plunge actuator torque, in accordance with NC instructions designed for machining components.

Applicants therefore respectfully submit that amended independent Claim 1, and by dependency Claims 3-5 and 21, is patentably distinct from Stotler. Applicants also respectfully submit that amended independent Claims 6, 11 and 16 recite subject matter similar to independent Claim 1. For example, amended independent Claims 6, 11 and 16 recite monitoring the torque of a plunge actuator configured for moving the FSW tool along a plunge axis, or accordingly controlling a FSW device such that the plunge actuator is driven to move the FSW tool into further or reduced contact with the workpiece based upon the torque and a range about a plunge torque setting. Also, for example, amended independent Claims 6, 11 and 16 recite monitoring torque in accordance with one or more numerical control (NC) instructions designed for machining components. Accordingly, Applicants respectfully submit that amended independent Claims 6, 11 and 16, and by dependency Claims 8-10, 13-15, 18-20 and 22-24, are also patentably distinct from Stotler, for at least the same reasons given above with respect to amended independent Claim 1.

For at least the reasons given above, Applicants respectfully submit that the rejection of Claims 1, 3-6, 8-11 and 13-15 as being anticipated by Stotler is overcome.

B. Claims 1, 3-6, 8-11, 13-16 and 18-20 are Patentable over Koga

The Official Action rejects Claims 1, 3-6, 8-11, 13-16 and 18-20 as being anticipated by Koga. Similar to the claimed invention, Koga also discloses a friction stir welding system and

method. In contrast to amended independent Claims 1, 6, 11 and 16, and similar to Stotler, however, Koga does not teach or suggest at least monitoring the torque of the plunge actuator in accordance with one or more numerical control (NC) instructions designed for machining components. Koga does disclose tool rotation driving means and tool movement driving means detecting load torque necessary to rotate and move a tool holding jig. Nowhere, however, does Koga teach or suggest monitoring that torque in accordance with NC instructions designed for machining components.

Applicants therefore respectfully submit that amended independent Claims 1, 6, 11 and 16, and by dependency Claims 3-5, 8-10, 13-15, 18-20 and 21-24, are patentably distinct from Koga. And for at least the reasons given above, Applicants respectfully submit that the rejection of Claims 1, 3-6, 8-11, 13-16 and 18-20 as being anticipated by Koga is overcome.

C. Claims 1, 3, 6, 8, 11, 13, 16 and 18 are Patentable over Yoshinaga

The Official Action rejects Claims 1, 3, 6, 8, 11, 13, 16 and 18 as being anticipated by Yoshinaga. In contrast to amended independent Claims 1, 6, 11 and 16, Yoshinaga does not teach or suggest monitoring the torque of a plunge actuator configured for moving the FSW tool along a plunge axis, or accordingly controlling a FSW device such that the plunge actuator is driven to move the FSW tool into further or reduced contact with the workpiece based upon the torque and a range about a plunge torque setting. And in further contrast to amended independent Claims 1, 6, 11 and 16, Yoshinaga does not teach or suggest monitoring torque in accordance with one or more numerical control (NC) instructions designed for machining components.

As previously explained, Yoshinaga discloses controlling the current (referred to as a torque current) to a motor rotating a tool to perform a friction stir welding operation. In this regard, during performance of a friction stir welding operation, the current is gradually increased to a point *I* as the tool is moved into further contact with a workpiece until a large-diameter portion of the tool reaches the workpiece, at which point the current jumps to point *I*. The current can then be increased to a determined value above *I*, which can be maintained during the friction stir welding operation. Thus, the Yoshinaga patent discloses controlling rotation of a

tool to perform a friction stir welding operation, rotation of the tool being controlled by application of current to the motor providing such rotation in the Yoshinaga system. Again, in contrast, the claimed invention controls plunge-axis torque of a plunge actuator to drive a tool into further or reduced contact with a workpiece.

Maintaining the rejection of the claims as being anticipated by Yoshinaga, the Official Action cites FIG. 5 of Yoshinaga for disclosing a relationship between plunge depth and torque. As disclosed in Yoshinaga, "FIG. 5 is a simplified diagram showing the relationship between the torque current of a motor rotating the tool 52 and the insertion depth of the tool 52 Yoshinaga, col. 4, ll. 14-17 (emphasis added). Thus, even considering FIG. 5, Yoshinaga still does not teach or suggest the plunge-axis torque features of the claimed invention. That is, FIG. 5 still only relates to rotational torque of a tool, as opposed to plunge-axis torque of the tool, as in the claimed invention.

Applicants therefore respectfully submit that amended independent Claims 1, 6, 11 and 16, and by dependency Claims 3-5, 8-10, 13-15, 18-20 and 21-24, are patentably distinct from Yoshinaga. And for at least the reasons given above, Applicants respectfully submit that the rejection of Claims 1, 3, 6, 8, 11, 13, 16 and 18 as being anticipated by Yoshinaga is overcome.

D. Claims 1, 3, 6, 8, 11, 13, 16 and 18 are Patentable over Kinton

The Official Action rejects Claims 1, 3, 6, 8, 11, 13, 16 and 18 as being anticipated by Kinton. Similar to the claimed invention, Kinton also discloses a friction stir welding system and method. In contrast to amended independent Claims 1, 6, 11 and 16, and similar to Stotler, Koga and Yoshinaga, however, Kinton does not teach or suggest at least monitoring the torque of the plunge actuator in accordance with one or more numerical control (NC) instructions designed for machining components. Kinton does disclose directing a servomotor to maintain a torque necessary to hold a pulley in position to maintain the depth of a friction stir welding tool within a workpiece. Nowhere, however, does Kinton teach or suggest monitoring that torque in accordance with NC instructions designed for machining components.

Applicants therefore respectfully submit that amended independent Claims 1, 6, 11 and 16, and by dependency Claims 3-5, 8-10, 13-15, 18-20 and 21-24, are patentably distinct from

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Kinton. And for at least the reasons given above, Applicants respectfully submit that the rejection of Claims 1, 3, 6, 8, 11, 13, 16 and 18 as being anticipated by Kinton is overcome.

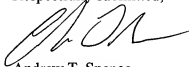
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CONCLUSION

In view of the amended and newly added claims, and the remarks presented above, Applicants respectfully submit that the present application is in condition for allowance. As such, the issuance of a Notice of Allowance is therefore respectfully requested. In order to expedite the examination of the present application, the Examiner is encouraged to contact Applicants' undersigned attorney in order to resolve any remaining issues.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,



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